$r\,[e^{(n+1)\phi\sqrt{-1}} - e^{-(n+1)\phi\sqrt{-1}}] = e^{n\phi\sqrt{-1}} - e^{-n\phi\sqrt{-1}}$; $\therefore$ $r\,[(\cos\varphi + \sin\varphi\sqrt{-1})^{(n+1)} - (\cos\varphi - \sin\varphi\sqrt{-1})^{(n+1)}] = (\cos\varphi + \sin\varphi\sqrt{-1})^n - (\cos\varphi - \sin\varphi\sqrt{-1})^n$; $\therefore$ $(x+y\sqrt{-1})^{(n+1)} - (x-y\sqrt{-1})^{(n+1)} = (x+y\sqrt{-1})^n - (x-y\sqrt{-1})^n$. A simpler form of the equation."]

PROBLEMS.

428. *By George Lilley, A. M.*—Two circles, of given radii, R and R_1, touch a straight line on the same side; a third circle of radius R_2 touches each of them; find the position of the circles R and R_1 and the radius of a fourth circle such that it shall touch the same straight line and each of the three given circles.

429. *By Prof. M. L. Comstock.*—A cone of given weight W, is placed with its base on an inclined plane, and supported by a weight W' which hangs by a string fastened to the vertex of the cone and passing over a pulley in the inclined plane at the same height as the vertex. Determine the conditions of equilibrium.

430. *By Prof. Milwee, Add-Ran Col. Texas.*—Given two fixed points A and B, one on each of the axes of coordinates, at the respective distances a and b from the origin; if A' and B' be taken on the axes so that $OA' + OB' = OA + OB$, find the locus of the intersection of AB' and $A'B$.

431. *By Prof J. W. Nicholson.*—Required the area of a triangle whose sides are equal to the three roots respectively of the following equation:

$$x^3 + mx^2 + nx + r = 0.$$

432. *By R. J. Adcock.*—Show that the quadrant of the ellipse equals

$$a\int_0^1 \left(\frac{1-e^2x^2}{1-x^2}\right)^{\frac{1}{2}} dx = \tfrac{1}{2}\pi\cos\theta\Big[1 + (\tfrac{1}{2}\tan\theta)^2 - \frac{1}{3}\left(\frac{1.3}{2.4}\tan^2\theta\right)^2 + \frac{1}{5}\left(\frac{1.3.5}{2.4.6}\tan^3\theta\right)^2 - \frac{1}{7}\left(\frac{1.3.5.7}{2.4.6.8}\tan^4\theta\right)^2 + \&c.\Big],$$

where $a =$ semi transverse axis, b semi conjugate, $e^2 = 1 - (b^2 \div a^2)$, $\tan^2\theta = e^2 \div (1 - e^2)$.

433. *By Prof. W. P. Casey.*—Given the base of a triangle, to find the locus of the vertex, when the centre of the inscribed square moves on a given conic section.

434. *By Prof. De Volson Wood.*—Find a number, the mantissa of the logarithm of which equals the number.

435. *By Prof. E. B. Seitz.*—Find the average area of a triangle drawn on the surface of a given circle, having its base parallel to a given line, and its vertex taken at random.

436. *By Prof. W. W. Johnson.*—Integrate the equation

$$x^m y^n(aydx + bxdy) = x^{m'} y^{n'}(a'ydx + b'xdy).$$

CORRECTION.—The last two lines on page 48 should read as follows:

$$\frac{b^2 \tan x}{a(n-1)(a^2-b^2)(a+b\sec x)^{n-1}} + \frac{(3n-4)a^2-(n-1)b^2}{a(n-1)(a^2-b^2)}\int\frac{dx}{(a+b\sec x)^{n-1}}$$
$$-\frac{3n-5}{(n-1)(a^2-b^2)}\int\frac{dx}{(a+b\sec x)^{n-2}} + \frac{n-2}{a(n-1)(a^2-b^2)}\int\frac{dx}{(a+b\sec x)^{n-3}}.$$

PUBLICATIONS RECEIVED.

Annual Report of the Chief Signal Officer to the Secretary of War for the year 1880. 1096 pp 8vo., with 119 maps. Washington. 1881.

Science. An Illustrated Weekly Journal. MOSES KING publisher. Boston, Mass.

The first number of this Journal bears date February 9, 1883, and is devoted, as its name imports, to current scientific news. Price $5.00 per year; single numbers 15 cents.

Universal Necessity. A Philosophical Essay, by WERNER STILLE, PH. D. 8v. 35 pages. St. Louis, Mo. 1881.

Acta Mathematica, edited by G. MITTAG-LEFFLER. F. & G. Beijer, Stockholm. 1882.

This new journal which has been founded through the generosity of King OSCAR II appears under the cooperation of several able Scandinavian mathematicians. The first number contains the following articles:

(1). Theory of Foxian Groups; by H. POINCARE′, pp. 1–62.
(2). On the Theory of Annuities; by J. C. MALMSTEN, pp. 63–76.
(3). A Method of Approximation in the Problem of three Bodies; by HUGO GYLDE′N, [pp. 77–92.
(4), The Problem of Configurations; by TH. REYE, pp. 93–96.

This number presents therefore a variety of subjects which are discussed by able writers. The article by Professor Gylden in which he gives an account of his method of treating the famous problem of three bodies will be interesting to astronomers. The theoretical solution of this problem remains nearly as it was left by Lagrange and Laplace, although we owe to Hansen and Delaunay important improvements in the practical parts of the work. It will be interesting to see the out-come of Gylden's labors on this question.

A. H.

ERRATA.

On page 12, line 9, for + between the two members of last term, read —.
" " " " 2, from bottom, for $\frac{1}{2}$ as index of (a^2-b^2), read $\frac{3}{2}$.
" " 14, " 3, from bottom, insert (f) at end of line.